Feb. 19, 1963 B. F. GOLDEN 3,078,072

LEVELING DEVICE FOR DERRICKS

Filed April 7, 1960 2 Sheets-Sheet 1

Fig.1

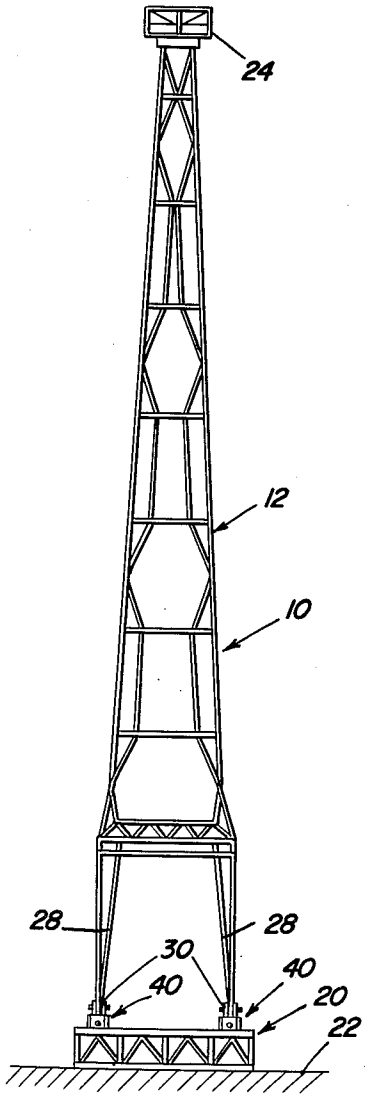
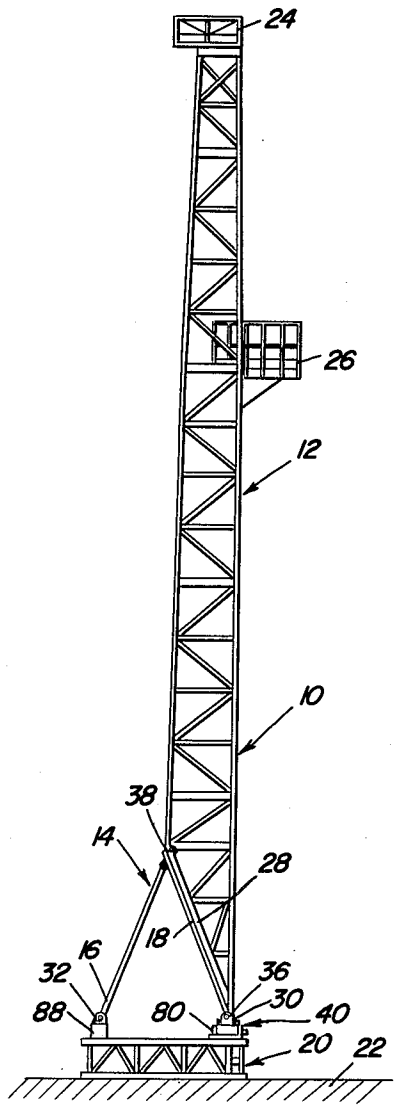


Fig.2



Bobby F. Golden
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Feb. 19, 1963 B. F. GOLDEN 3,078,072

LEVELING DEVICE FOR DERRICKS

Filed April 7, 1960 2 Sheets-Sheet 2

Fig.3

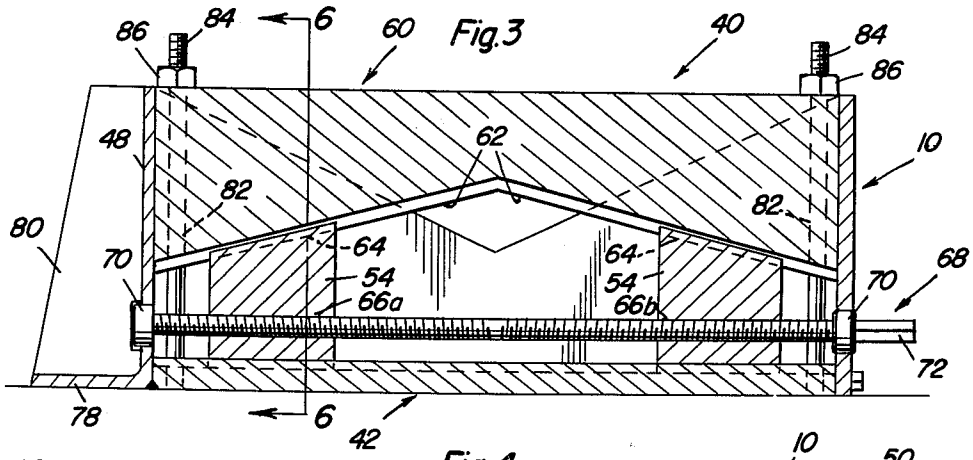


Fig.4

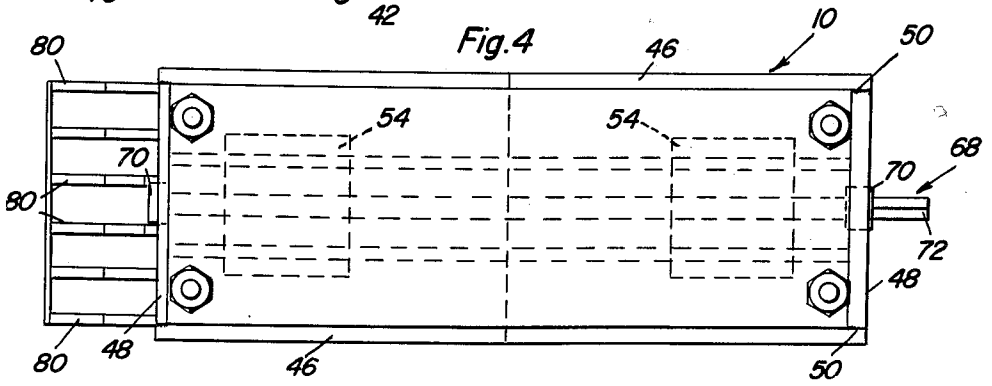


Fig.5

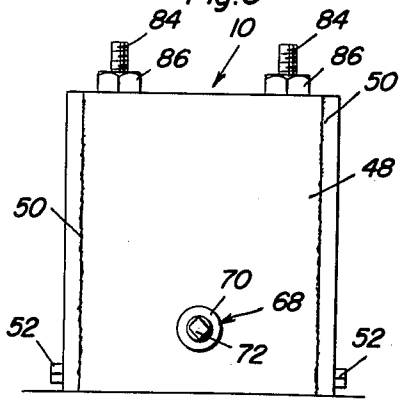
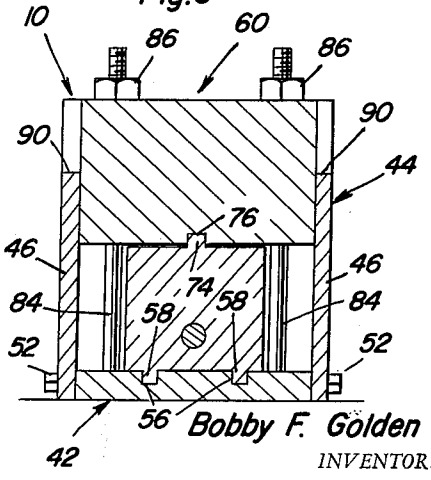


Fig.6



Bobby F. Golden
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office

3,078,072
Patented Feb. 19, 1963

3,078,072

LEVELING DEVICE FOR DERRICKS

Bobby F. Golden, Box 1125, Kermit, Tex.

Filed Apr. 7, 1960, Ser. No. 20,749
7 Claims. (Cl. 254—104)

This invention relates to a novel and useful leveling attachment for derricks, and more particularly to a leveling attachment specifically adapted for use in leveling jackknife derricks.

The most conventional forms of jackknife derricks are provided with a sub-structure or base which forms a foundation for the mast of the derrick. The derrick also includes an A-frame having two pair of depending legs. Each pair of depending legs of the A-frame are parallel and the mast of the derrick is provided with two inclined legs which are pivotally secured at their lower-most ends to the lower portions of one pair of A-frame legs. The angulated legs of the mast extend along the one pair of A-frame legs and are secured at their upper end to the upper ends of the one pair of A-frame legs. The two legs of the mast section are pivotally secured to the lower portions of the one pair of A-frame legs for movement about an axis of rotation extending between the lowermost ends of the mast legs. The mast section of the derrick may then be pivoted from an upstanding position to a horizontally disposed position for ease of transporting from one locality to another. When it is desired to erect the mast section of the derrick, it is rotated to a substantially vertically disposed position and then secured to the upper portions of the legs of the A-frame.

It is of course extremely important that the sub-structure or base of the derrick be level so that when the mast section is raised it will be disposed substantially vertically. In many cases however, the sub-structure or base of the derrick will settle along one side edge thereof and the only previous effective means of leveling the sub-structure was to wash the ground out from under the high side of the sub-structure or base. Quite frequently, however, the result of this operation would be that too much soil or dirt would be removed then necessitating the soil be washed out from beneath the original low side of the sub-structure or base.

The present invention provides a means whereby the pair of legs of the A-frame to which the legs of the mast are secured may be adjustably and vertically positioned relative to the sub-structure or base of the derrick so that the mast may be maintained in a substantially vertically disposed position. It is to be noted that the present invention will also, in addition to adjusting the forward and rearward inclination of the mast, also enable the sideways inclination of the mast to be adjusted.

The main object of this invention is to provide a leveling attachment for jackknife derricks and the like which will enable the mast of the derrick to be maintained in a substantially vertically disposed relation.

A further object of this invention, in accordance with the immediately preceding object, is to provide a leveling attachment which will also enable the drilling string to be maintained centrally disposed relative to the rotary table of the derrick.

Yet a further object of this invention is to provide a leveling attachment which may be easily adapted to substantially every type of jackknife derrick to perform its desired function.

A final object to be specifically enumerated herein is to provide a leveling attachment which will conform to conventional forms of manufacture, be of simple construction and easy to operate so as to provide a device that will be economically feasible, long lasting and capable of performing its desired function with a minimum amount of effort on the part of the workman handling the derrick.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a front elevational view of a jackknife type derrick shown with the leveling attachment comprising the present invention disposed between the front legs of the A-frame and the sub-structure or base of the derrick;

FIGURE 2 is a side elevational view of the derrick as seen from the left side of FIGURE 1;

FIGURE 3 is an enlarged longitudinal vertical sectional view of the leveling attachment taken substantially upon a plane passing along the center line thereof;

FIGURE 4 is an enlarged top plan view of the leveling attachment;

FIGURE 5 is an end elevational view of the leveling attachment as seen from the right side of FIGURE 3; and

FIGURE 6 is a transverse vertical sectional view taken substantially upon a plane indicated by section line 6—6 of FIGURE 3.

Referring now more specifically to the drawings the numeral 10 generally designates a jackknife type of derrick having a mast section generally referred to by the reference numeral 12 and an A-frame supporting member generally referred to by the reference numeral 14 which includes a pair of rear legs 16 and a pair of front legs 18. The jackknife derrick 10 is supported by a sub-structure or base generally referred by the reference numeral 20 which is in turn supported by the ground 22 on which the derrick 10 is placed. The mast section 12 inc'udes a crown safety platform 24 and a racking platform 26 which are of conventional design. The mast 12 includes a pair of inclined legs 28 which are pivotally secured at their lowermost ends to foot members 30 that are secured to the lowermost ends of the forward legs 18 of the A-frame 14. Each of the rear legs 16 of the A-frame 14 also includes a foot member 32 which is pivotally secured thereto.

Ordinarily, each of the foot members 30 and 32 are rigidly secured to the sub-structure or base 20 in any convenient means such as by bolting or welding. The sub-structure or base 20 is positioned on the ground 22 in a horizontally disposed position and the mast 12 may be pivoted between a horizontally disposed position and an upstanding position such as that shown in FIGURE 2 about an axis 36 extending between the lowermost ends of the legs 28 of the mast 12.

With particular attention directed to FIGURE 2 of the drawings it will be noted that the legs 28 of the mast 12 have at least a portion thereof extending along the forward legs 18 of the A-frame 14. The uppermost ends of those portions of the legs 28 are secured to the upper end of the A-frame 14 in any convenient manner as at 38 when it is desired to maintain the mast 12 in a vertically disposed position.

In some cases, due to inclement weather and other factors, the sub-structure or base 20 will settle somewhat causing the mast 12 to incline from its substantially vertically disposed position. This inclination of the mast 12 not only unbalances the normal stresses on the derrick 10 but also causes the drilling string to be located off-center with respect to the rotary table of the derrick 10. This of course causes the drill string to rub against the sides of the rotary table and considerable time is lost during the operations of trying to set the slips in making connections in the drilling string. Further, the wear of the drilling string is also greatly increased.

The leveling attachment comprising the present invention is generally designated by the reference numeral 40 and it will be noted that a pair of levelling attachments

40 are interposed between the lowermost ends of the legs 28 of the mast 12 and the sub-structure or base 20, see FIGURES 1 and 2.

The leveling attachment 40 includes a base generally designated by the reference numeral 42 which may be rigidly secured to the sub-structure or base 20 in any convenient manner. A housing generally designated by the reference numeral 44 extends upwardly from the base 42 and includes a pair of side walls 46 and a pair of end walls 48. The side walls 46 and end walls 48 of the housing 44 are secured together in any convenient means such as by welding 50 although it is to be understood that bolts and/or rivets may be used such as bolts 52 which are utilized to secure the lower edges of the housing 44 to the outer peripheral edges of the base 42.

A pair of wedge members 54 are disposed in said housing for sliding longitudinal movement therein over the upper surface of the base 42. The base 42 is provided with a pair of longitudinally extending channels which are parallel and each of the wedge members 54 has formed on its lower surface two longitudinally extending ribs 58 that are slidably disposed in the channels 56 for movement therealong.

A lift section generally designated by the reference numeral 60 is slidably disposed in the housing 44, which defines thrust bearing and guide means, for vertical movement toward and away from the base 42.

It will be noted, see FIGURE 4, that the lift section 60 is snugly received within the side and end walls 46 and 48 and that it is provided with a pair of oppositely inclined lower surfaces 62 which are complementary to the oppositely inclined upper surfaces 64 of the wedge members 54.

The wedge members 54 are provided with threaded bores 66 and the bores 66*a* and 66*b* are oppositely threaded. A screw shaft generally referred to by the reference numeral 68 has its opposite end portions journalled through the end walls 48 of the housing 44 by means of bearing assemblies 70. The opposite end portions of the screw shaft 68 disposed inwardly of the bearings 70 are oppositely threaded and are threadedly engaged with the bores 66*a* and 66*b*. One end portion of the screw shaft 68 is provided with a noncircular extension 72 to which suitable means (not shown) may be secured for effecting rotation of the screw-shaft 68. It will be noted that upon rotation of the screw shaft 63 that the wedge members 54 will be moved toward and away from each other between the end walls 48 of the housing 44. As the wedge members are moved apart, the lift section 60 is raised and when the wedge members are moved toward each other the lift section 60 is lowered toward the base 42. The inclined surfaces 64 of the wedge members 54 are each provided with at least one rib portion 74 which is slidably received in a channel 76 formed in the inclined surfaces 62 of the lift section 60. Thus, not only do the walls 46 and 48 of the housing 44 guide the movement of the lift sections 60 toward and away from the base 42, but the ribs 58 and 74 engaged in the channels 56 and 76 respectively also resist movement of the lift section 60 transversely of the base 42. Inasmuch as the axis of rotation 30 of the mast 12 extends at right angles to the sliding movement of the wedge members 54, the ribs 58 and 74 resist movement of the legs 28 of the mast 12 along the axis of rotation of the mast 12.

It will be noted that the end wall 48 of the housing 44 remote from the non-circular extension 72 is provided with a horizontally disposed base flange 78. A plurality of gussets 80 are secured between the upper surface of the base flange 78 and the outer surface of the adjacent end wall 48. The gussets 80 provide a considerable amount of extra strength to the end wall 48 and it will be noted that the end wall 48 is disposed adjacent the rear legs 16 of the A-frame 14.

When the mast 12 is being raised to a vertical position, considerable stresses are placed upon the foot members 30 secured to the lower ends of the front legs 18 of the A-frame 14 and these stresses tend to urge the lower ends of the front legs 18 toward the rear legs 16. The end wall 48 reinforced by gussets 80 provides the additional strength needed when raising the mast section 12 to a vertical position and defines thrust bearing means for preventing longitudinal shifting of the lift section toward the legs 16.

Further, the lift section 60 is provided with a plurality of vertical bores 82 which receive the upper ends of studs 84. The studs 84 have their lower ends rigidly secured to the base 42 and threaded fasteners 86 are secured to the upper threaded ends of the studs 84 for limiting the movement of the lift sections 60 away from the base 42.

In operation, if it is desired to move the upper end of the mast 12 as seen in FIGURE 2 to the left in order to bring it to a vertical position, after the attachment 10 has been secured between the foot members 30 carried by the legs 28 and the substructure or base 20 and spacer blocks 88 have been disposed between the foot members 32 and the sub-structure or base 20 to compensate for the mean vertical height of the attachment 10, the screw shaft 68 is rotated in a clockwise direction as seen from the right side of FIGURE 3 in order to move the wedge members 54 away from each other and thereby increase the vertical height of the lift member 60 above the base 42. This will in effect lengthen the front legs 18 of the A-frame 14 in order to move the upper end of the mast 12 to the left in FIGURE 2 of the drawings.

It will be noted that the side walls 46 of the housing 44 are provided with upwardly opening V-shaped notches 90 in order that the position of the lift section 60 relative to the base 42 may be observed. Further, it is to be understood that registering adjacent surfaces of the edges of the V-shaped notches 90 and the inclined surfaces 62 of the lift section 60 may be provided with suitable indicia so that the adjustment of the attachment 10 may be effected in an accurate manner.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A jack comprising a flat elongated plate-like base, a pair of wedge members slidably disposed on the upper surface of said base for movement longitudinally of said base toward and away from each other, an elongated lift section overlying said wedge members extending longitudinally of said base and provided with oppositely inclined lower surfaces, each of said wedge members having an inclined upper surface complementary to and in sliding contacting relation with one of said inclined lower surfaces of said lift section, means secured between said wedges for adjusting the distance therebetween whereby the distance between said base and lift section may be varied, guide means on the upper and lower surface of said wedge members engaging the adjacent portions of said lift section and base respectively and restricting sliding movement of said wedge members along said base and lift section to movement longitudinally thereof, and thrust bearing means rigidly secured to said base and disposed in sliding contacting relation with said lift section preventing longitudinal shifting of said lift section in one drection.

2. The combination of claim 1 wherein said thrust bearing means comprists an upstanding tubular housing rigidly secured to said base enclosing said wedge members and in which said lift section is snugly and slidably received.

3. The combination of claim 2 wherein said housing

includes one end wall opposing longitudinal shifting of said lift section provided with heavy external bracing from said base.

4. The combination of claim 1 wherein said thrust bearing means slidably engages said lift section and limits movement of the latter to that of at right angles to the movement of said wedge members.

5. The combination of claim 1 including adjustable means carried by said base and engaging said lift section for limiting movement of the latter from said base.

6. The combination of claim 1 wherein said thrust bearing means slidably engages said lift section and limits movement of the latter to that of at right angles to the movement of said wedge members, said thrust bearing means including a vertically extending hollow housing secured to said base and slidably receiving said lift section, oppositely threaded bores formed through and extending in the direction of travel of said wedge members, said

adjusting means including a screw shaft having oppositely threaded end portions, means journalling said shaft through opposite ends of said housing.

7. The combination of claim 1 wherein each of said guide means includes at least one outwardly projecting and longitudinally extending rib, at least one longitudinally extending groove formed in said base and said lift members slidably receiving said ribs.

References Cited in the file of this patent

UNITED STATES PATENTS

466,650	Bogen et al.	Jan. 5, 1892
722,753	Rhodes et al.	Mar. 17, 1903
2,570,901	Woolslayer et al.	Oct. 9, 1951
2,847,098	Heinish	Aug. 12, 1958

FOREIGN PATENTS

4,437	Great Britain	of 1878